REMARKS/ARGUMENTS

General

Applicants have amended the abstract and claims to put this application in full and clear condition for allowance. Applicants have amended the abstract to conform to the 150 word limit. They have amended the claims to remove unnecessary verbiage. They have amended the claims to particularly point out and distinctly claim the subject matter of the invention and its technological basis, and define the invention patentably over the prior art. They have also provided the references requested by the examiner. No new matter is added.

Objection to the Abstract

Examiner asserts:

> "The abstract of the disclosure is objected to because the Abstract is over 150 works in length."

Applicants have shortened the abstract of the disclosure to conform to the 150 word limit, with careful attention to the language and format requirements of the abstract.

Claim Objections to Claims 5 and 6

Examiner asserts:

> "Claims 5 and 6 objected to because of the following informalities: Claim 5, lines 1 an 2 and claim 6, line 1 recites "act of". The usage of "act of" is considered unnecessary in the claim limitation. Appropriate correction is required."

Applicants have removed "act of" from the language of Claims 5 and 6.

Rejection of Claims 1, 6, 8, 12 and 13 under 35 USC § 112

Examiner asserts:

> "Claims 1, 6, 8, 12, and 13 are rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention."

Applicants have amended Claims 1, 6, 8, 12, and 13 as requested by the examiner to "particularly point out and distinctly claim the subject matter which applicant regards as the invention." Applicants have invented a method and a system of constructing investment portfolios based on a two-segment utility function that is not disclosed in prior art.

Examiner asserts:

> "It is unclear in the claim language of claims 1, 8, and 12 what is being done with the maximizing of the utility. The U's in claims 1, 8, and 13 do not seem to have any impact on the selection process. How do the U's flow back into the maximization point? Is it the number of shares or securities in the portfolio? How do the calculations in claims 1, 6, 8, and 13 feed back into creating or building the portfolio?"
> These are considered essential elements that need to be clarified in the claims."

Applicants have amended Claims 1 and 8 to clarify them as requested by the examiner, and they now recite, "... allocating investment funds to a plurality of assets to construct an investment portfolio ...", and also recite "... allocating the investment funds to the said plurality of assets to maximize an expected utility of the investment portfolio; ...". The method and system produce the optimal allocation of investment funds such that the investment portfolio's expected utility is maximized. In the field of portfolio construction "allocating investment funds" to construct a portfolio, has the same meaning as "selecting" a portfolio. The amendment replaces the latter with the former, which is clearer but does not add any new matter.

Applicants have amended Claims 5 and 12 to clarify them as requested by the examiner, and they now recite, "... determining an optimal investment weight for each one of the plurality in the investment portfolio." Claims 5 and 12 narrow claims 1 and 8 respectively. The method and

system claimed in claims 1 and 8 could produce an optimal allocation to each asset in terms of dollars, or investment weights, while in claims 5 and 12 the optimal allocation is claimed to produce optimal investment weights only. On page 9, line 4-5, the specification teaches how "optimal asset weights" are determined, thus no new matter has been added.

Applicants have amended Claims 6 and 13 as requested by the examiner to clarify the calculations of portfolio return and portfolio utility for each economic event s, and the expected utility of the portfolio, and to recite, "... optimizing the investment weight w_i for each of the N assets from which the portfolio is selected to maximize the portfolio's expected utility $E(U)$." The optimization involves an iterative process (an algorithm) to select the investment weights w_i such that the expected utility of the investment portfolio $E(U)$ is maximized, thereby constructing the portfolio. This is the process through which "the U's flow back into the maximization point." On page 9, lines 3-10, the specification teaches those skilled in the art that a mathematical programming algorithm such as the one described in, "A Feasible Conjugate Direction Method to Solve Linearly Constrained Minimization Problems", by Michael J. Best, published in the Journal of Optimization Theory and Applications, Vol. 16, No. 1-2, pages 25-38, July 1975, which is **incorporated in the specification by reference in its entirety**, can be used to determine the optimal asset weights to maximize the expected utility of the portfolio; the optimization algorithm is explained in detail on pages 27-28 of this reference. No new matter has been added.

Rejection of Claims 1, 5 and 6 under 35 USC § 101

Examiner asserts:

> "Claims 1, 5 and 6 are rejected under 35 U.S.C. 101 as non-statutory. The method claims presented do not claim a technological basis in the body of the claim. Without a claimed basis, the claim may be interpreted in an alternative as involving no more than a manipulation of an abstract idea and therefore non-statutory under 35 U.S.C. 101. In contrast, a method claim that includes in the body of the claim at least one structural/functional interrelationship which can only be computer implemented is

> considered to have a technological basis [See Ex parte Bowman, 61 USPQ2d 1669,1671 (Bd. Pat. App. & Inter. 2001) –used only for content and reasoning since not precedential]."

Applicants have amended Claim 1 as requested by the examiner and it now recites, "... allocating investment funds to a plurality of assets to construct an investment portfolio ...", and also recites "... allocating the investment funds to the said plurality of assets to maximize an expected utility of the investment portfolio; ...". The optimization process that must be used to allocate investment funds to a plurality of assets to maximize the expected utility of the investment portfolio requires millions and possibly billions of calculations, and can only be implemented on a computer, thus the method claim as presented now satisfies the requirement for a technological basis under 35 U.S.C. 101. To emphasize that point the claim's language starts by reciting, "A computer-implemented method ...".

Claims 5 and 6 are dependent on claim 1 and are thus allowable for at least the same reasons as claim 1.

Request for Documentation

Examiner asserts:

> "As a preliminary matter, Applicants' are respectfully requested for the following information in an effort to move the prosecution forward: Are these formulas found in a textbook or other document? If the formulas are found in a textbook or other document, it is respectfully requested the document or document be submitted for review. However, the formula "u = 1 + ln(1+r)" was found in "Higher Return, Lower Risk: Historical Returns On Long-Run, Actively Managed Portfolios of Stocks, Bonds and Bills. 1936-1978," by Robert R. Grauer and Nils H. Hakansson."

As requested by the examiner, applicants have submitted the following references for log-utility and power-utility functions:

(1) "Modern Portfolio Theory and Investment Analysis," by Edwin J. Elton and Martin J. Gruber, 5th. Edition, John Wiley & Sons, Inc., New York, 1981, 1984, 1987, 1991, 1995, shows

the log-utility function in Footnote 6 on page 234. A copy of the referenced page has been submitted for review with the log-utility function underlined.

(2) "Financial Theory and Corporate Policy," by Thomas E. Copeland and J. Fred Weston, 3rd. Edition, Addison-Wesley Publishing Company, Reading, 1988, shows the power-utility function on page 90. A copy of the referenced page has been submitted for review with the power-utility function underlined.

(3) "Convergence to Isoelastic Utility and Policy in Multiperiod Portfolio Choice," by Nils H. Hakansson, Journal of Financial Economics, 1 (1974) 201-224, shows the power-utility function in Equation 18 on page 207. A copy of the paper has been submitted for review with the power-utility function underlined on page 207.

The same utility function can be expressed in different forms, because utility functions are invariant to a positive linear transformation. Hence the different expressions of the log-utility and power-utility functions shown in the references. The same utility function can be expressed in terms of wealth or returns, since starting wealth is constant, as shown in Footnote 6 on page 234 of the Elton and Gruber reference. Francis and Archer explain this property of utility functions on page 208 of "Portfolio Analysis," by Jack Clark Francis and Stephen H. Archer, Prentice-Hall, Inc., Englewood Cliffs, 1971. A copy of the referenced page from Francis and Archer has been submitted for review.

Examiner asserts:

> "The following reference on page 1, lines 22-24 of Applicants' Specification entitled "Portfolio Selection," Journal of Finance 7, no. 1, March 1952, 77-91 is missing from the file. Applicants' are respectfully requested to resubmit this reference for consideration and review."

As requested by the examiner, applicants have resubmitted a copy of the paper, "Portfolio Selection," by Harry Markowitz, Journal of Finance 7, No. 1, March 1952, 77-91, for consideration and review.

Prior Art

Examiner asserts in Conclusion:

> "The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
> M. J. Brennan, "The Role of Learning in Dynamic Portfolio Decisions," disclosed the utility function as being logarithmic."
> Seppo Pynnonen, Ph.D. "Use of Modern Portfolio Theory in Systematic portfolio Strategies," disclosed a systematic portfolio and a investor's utility function.
> Bekaert et al (US 6,125,355) disclosed a pricing module theoretical structure.
> Williams et al (US 5,999,918) disclosed financial investments involving probabilistic distributions."

Applicants respectfully submit that the literature on the subject of investment portfolio construction is vast, and that they disclosed the prior art closest to the subject of the invention in this application.

M. J. Brennan in "The Role of Learning in Dynamic Portfolio Decisions," discloses the logarithmic utility function on page 6. The log-utility function has been disclosed by several authors including Elton and Gruber in the reference "Modern Portfolio Theory and Investment Analysis," by Edwin J. Elton and Martin J. Gruber, 5th. Edition, John Wiley & Sons, Inc., New York, 1981, 1984, 1987, 1991, 1995, cited above and submitted for review. Neither one of these references discloses a two-segment utility function that consists of a log-utility function for positive returns and a power utility function with power less than or equal to zero for negative returns, nor do they disclose a method or a system for constructing investment portfolios based on such a utility function.

Seppo Pynnonen, Ph.D. "Use of Modern Portfolio Theory in Systematic portfolio Strategies," disclosed a systematic portfolio and an investor's utility function. Pynnonen discloses on pages 7-8, that the method described is based on the mean and variance of the portfolio return distribution, and the investor's utility function is the mean-variance utility function in Equation (4.1). This method was disclosed on pages 81-82 as the "E-V rule" by Harry Markowitz in the

reference "Portfolio Selection," Journal of Finance 7, No. 1, March 1952, 77-91, which has been resubmitted. Neither one of these references discloses a two-segment utility function that consists of a log-utility function for positive returns and a power utility function with power less than or equal to zero for negative returns, nor do they disclose a method or a system for constructing investment portfolios based on such a utility function.

Bekaert et al (US 6,125,355) disclose equations for pricing fixed-income securities and equity securities, and they also disclose "... a system for analyzing asset portfolios ...." They do not disclose a method or a system for constructing investment portfolios, nor do they disclose a two-segment utility function that consists of a log-utility function for positive returns and a power utility function with power less than or equal to zero for negative returns.

Williams et al (US 5,999,918) disclose a method for interactively manipulating probabilistic distributions and using simulation techniques to indicate the level of confidence that an investor might meet stated goals. They do not disclose a two-segment utility function that consists of a log-utility function for positive returns and a power utility function with power less than or equal to zero for negative returns, nor do they disclose a method or a system for constructing investment portfolios based on a utility function.

Outside Recognition

As requested by the examiner on the telephone, applicants have submitted a copy of "Growth Optimization for Downside Protection, A New Paradigm for Portfolio Selection," by the first named inventor Jivendra K. Kale in support of this application. The paper shows the difference between investment portfolios constructed by using (1) the mean-variance utility function (Markowitz), (2) power-utility functions, and (3) the two-segment utility function of the invention in this application. The log-utility function is also included in the paper as a special case. The differences in the characteristics of the portfolios constructed by using the different utility functions are surprising and unobvious enough, that the paper has been accepted for publication in the Journal of Behavioral Finance. The Journal of Behavioral Finance is a highly regarded academic journal in the field of finance, and only publishes new and original research.

The forthcoming publication supports the applicants' invention as being different from prior art. The July 29, 2005 e-mail from the managing editor of the Journal of Behavioral Finance accepting the paper for publication follows:

Date: Fri, 29 Jul 2005 06:42:37 -0500
From: Deborah Trask <dtrask@investmentresearch.org>
To: 'Jivendra Kale' <jkale@stmarys-ca.edu>
Subject: Journal of Behavioral Finance
Part(s): 2 pub-agreement.doc application/msword 47.21 KB

Dear Professor Kale:

Your submission entitled Growth Optimization with Downside Protection has been accepted for publication. Attached is a publication agreement which should be signed and faxed back to me at 817-410-4684.

Thank you for your interest in the journal.

Regards,
Deborah Trask

Managing Editor
Journal of Behavioral Finance

817-410-4683

CONCLUSION

In view of the foregoing, Applicants believe that the abstract and all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

Conditional Request for Constructive Assistance

Applicants have amended the abstract and claims of this application so that they are proper, definite, and define the novel structure. If, for any reason this application is not believed to be in

full condition for allowance, applicants respectfully request the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. § 2173.02 and § 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,

Jivendra K. Kale

Jivendra K. Kale Michael J. Best

Applicants Pro Se

Enclosures:

(1) "Modern Portfolio Theory and Investment Analysis," by Edwin J. Elton and Martin J. Gruber, 5th. Edition, John Wiley & Sons, Inc., New York, 1995, page 234.

(2) "Financial Theory and Corporate Policy," by Thomas E. Copeland and J. Fred Weston, 3rd. Edition, Addison-Wesley Publishing Company, Reading, 1988, page 90.

(3) "Convergence to Isoelastic Utility and Policy in Multiperiod Portfolio Choice," by Nils H. Hakansson, Journal of Financial Economics, 1 (1974) 201-224.

(4) "Portfolio Analysis," by Jack Clark Francis and Stephen H. Archer, Prentice-Hall, Inc., Englewood Cliffs, 1971, page 208.

(5) "Portfolio Selection," by Harry Markowitz, Journal of Finance 7, No. 1, March 1952, 77-91. (Resubmitted)

(6) "Growth Optimization for Downside Protection, A New Paradigm for Portfolio Selection," by Jivendra K. Kale, St. Mary's College of California, 2004.

(7) "A Feasible Conjugate Direction Method to Solve Linearly Constrained Minimization Problems", by Michael J. Best, Journal of Optimization Theory and Applications, Vol. 16, No. 1-2, pages 25-38, July 1975. (Resubmitted)

(8) "Higher Return, Lower Risk: Historical Returns On Long-Run, Actively Managed Portfolios of Stocks, Bonds and Bills, 1936-1978," by Robert R. Grauer and Nils H. Hakansson, Financial Analysts Journal, March-April 1982. (Resubmitted)

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